



The Outlook Tool

*A Tool from the Strategic Capability Roadmap Version 1.0
Tool-suite*

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DRDC CORA TN 2009-028
June 2009

Defence R&D Canada
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Technical Note
DRDC CORA TN 2009-028
June 2009

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Abstract

From Fall 2007 to Spring 2008, the Strategic Planning Operational Research (OR) Team, Joint Staff OR Team and Central OR Team provided support to the Chief of Force Development during development of the first version of the Strategic Capability Roadmap (SCR). The SCR is a capability plan that ultimately prioritizes and schedules the programs necessary to meet the demands of the future security environment over the next 20 years.

As part of their contribution, JSORT developed the Outlook Tool which is used to compress a large amount of data, based on Subject Matter Expert capability assessments, into a prescribed format that was comprehensive, understandable, traceable, and presentable. This allowed the Capability Outlook to be briefed at a high level while being supported by rigorous data. This paper describes how the Outlook Tool works, and how its results are interpreted.

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Acknowledgements

The Outlook Tool made up one piece of the SCR puzzle, and the author wishes to acknowledge the efforts of the rest of the SCR scientific team: Gary Christopher, Debbie Blakeney, Roman Petryk, Leonard Kerzner, Ben Taylor, Andrew Beard, and Van Fong.

1 Introduction

1.1 Background

From Fall 2007 to Spring 2008, the Strategic Planning Operational Research (OR) Team, Joint Staff OR Team and Central OR Team provided support to the Chief of Force Development (CFD) during development of the first version of the Strategic Capability Roadmap (SCR). The SCR is a capability plan that ultimately prioritizes and schedules the programs necessary to meet the demands of the future security environment over the next 20 years.

During the SCR process, 8 of the 18 Canadian Forces (CF) Force Planning Scenarios were analyzed to determine what Force Goals (FG) the CF should be able to accomplish to fulfil its mandate. The 8 scenarios chosen were considered to be representative of a significant majority of the missions that the CF will be expected to take on in the next 20 years. The ForGE+ tool [1] was then used to collect a vast amount of data based on subject matter expert assessments of how every Force Element (FE) belonging to the CF contributes to every FG identified by the Scenario Analysis.¹ ForGE+ saved its results as a string of 1's and 0's for each FE and each Capability in every year. In these strings a 1 represented a FG related to that Capability that was satisfied by that FE in that year, while a 0 represented a FG that was not satisfied. A Capability's completeness was considered to be the percentage of its related FGs that were satisfied.

The purpose of the Outlook Tool is to compress that data into a comprehensive, understandable, traceable, and presentable format. The final Outlook Tool was used to brief the SCR data in [2]. The wider SCR process is being reported as a whole in [3].

1.2 Template

As a result of previous work done to create a nominal SCR, an Outlook Tool already existed which presented results in three different views. The most meaningful view for the purposes of presentation and generating understanding was labelled View 3, and it is this view that the new Outlook Tool is intended to replicate. The View 3 that was used as a template is presented in Figure 1. The spreadsheet is divided into 5 sections for the Act, Command, Sense, Shield, and Sustain Domains. Each of these Domains is further subdivided into Capabilities. For each Capability, there is a list of FEs that contribute to it (many of these FEs are repeated across several Capabilities). Columns C through T in the spreadsheet represent the years that are being considered for the Outlook, in this case 2008 through 2025. For each year, there is a letter indicating how much the FE in column B contributes to the Capability in Column A (S for Strong contribution or P for Partial contribution), or a blank indicating that that FE does not contribute to the Capability at that time (either because it has not been implemented yet or has been retired); FEs that do not contribute throughout the Outlook are not listed.

¹ FEs are the functional assets, or groups of assets that the CF owns or plans to obtain. FGs are the measurable effects that the CF intends to achieve. Capabilities are a measure of the ability to achieve related FGs. For example, the ability to provide sea control in the littorals of a 400 x 400 km Area of Responsibility is one FG associated with the Maritime Effects Capability.

In the row following the FEs which contribute to each Capability, there is a stoplight chart indicating the overall satisfaction of that Capability for each year. Green indicates that the Capability is satisfied, yellow indicates a shortfall in the satisfaction of the Capability, and red indicates a serious shortfall. The definitions of “satisfaction”, “shortfall” and “serious shortfall” varied throughout the SCR process and will be discussed further in Section 2.1.

In the last row pertaining to each Domain, there is another stoplight chart representing the aggregated results of the Capabilities within the Domain. Following the philosophy that a chain is only as strong as its weakest link, the aggregate is simply equal to the worst result among the Capabilities.

The + and - signs on the left side of the spreadsheet are clickable buttons to show or hide the FEs associated with the Capability beside the button.

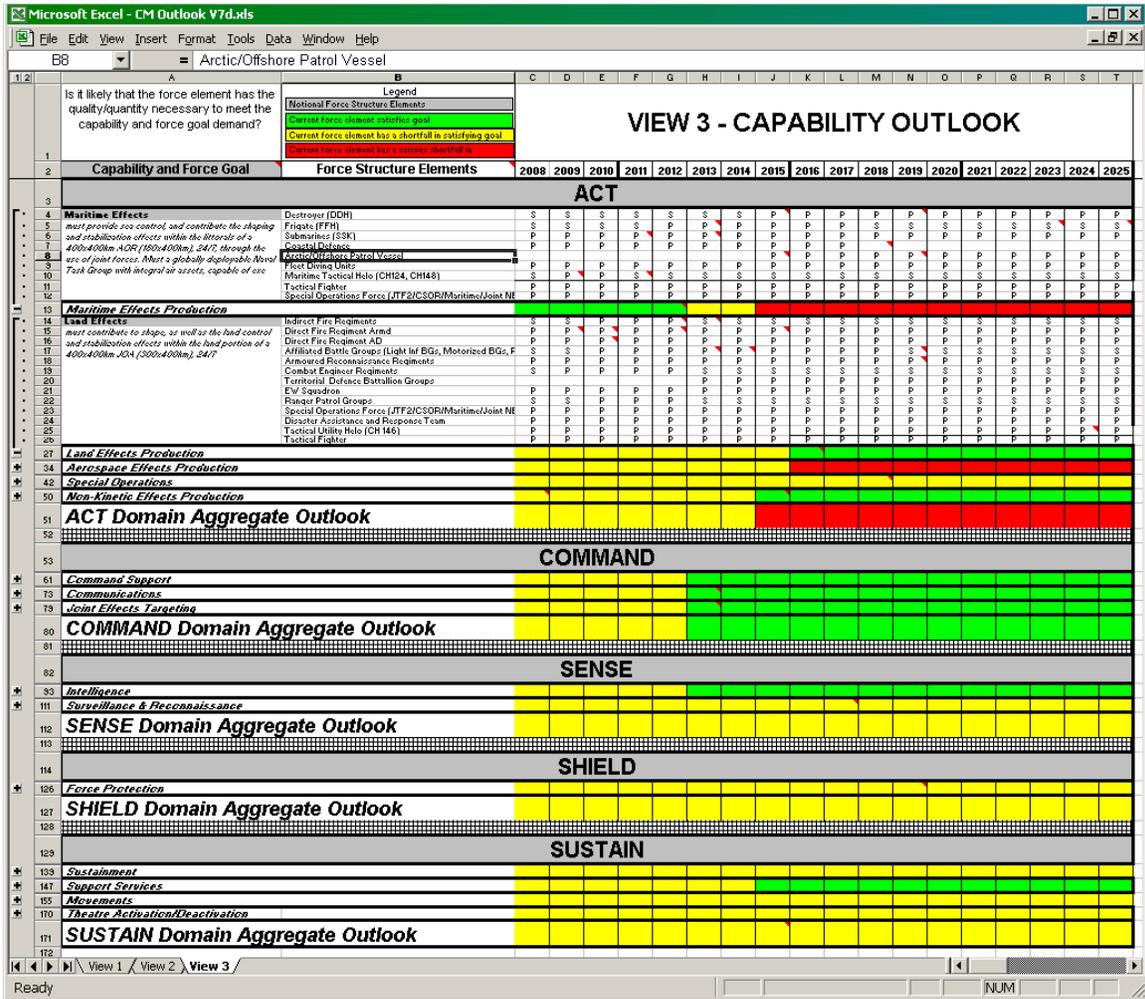


Figure 1: SCR Outlook Template

2 The Spreadsheet

The final version of the Outlook Tool preserved the original look and feel of the template, but added macros to fill in the data, buttons to run those macros, and header rows containing user-definable values that the macros refer to. For presentation purposes, these top cells can be hidden so only the portion corresponding to the original template will be seen. The unpopulated Outlook Tool is illustrated in Figure 2.

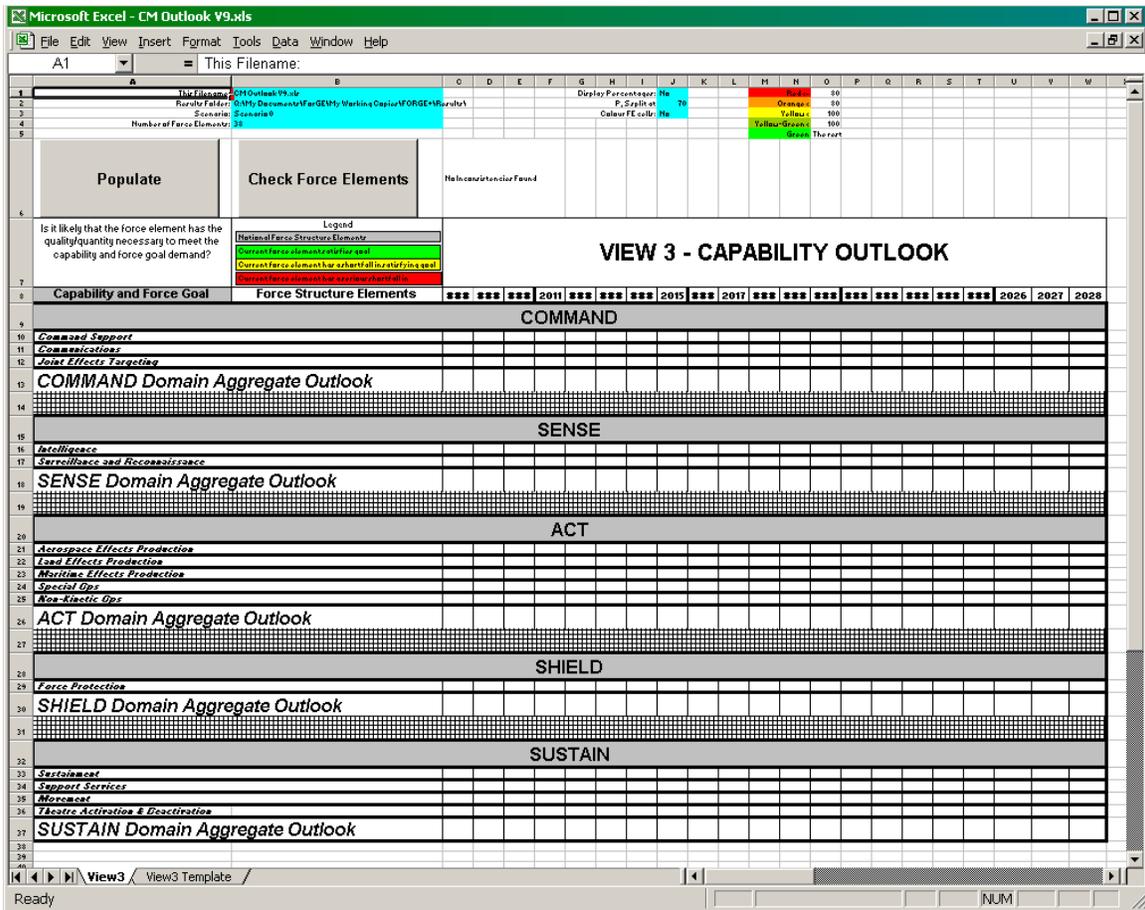


Figure 2: Blank Outlook Tool

Note that in Figure 2 the order of the Domains has been changed as compared to the template in Figure 1 so to be in the same order as is typically used for CFD purposes. Extra columns have also been added to allow the Outlook to span 20 years, in this case 2008 to 2028.

2.1 Header Rows

The top five rows of the Outlook Tool allow the user to specify information that will be read into the macros used to populate the spreadsheet. The first four information items that the user inputs

need to be correct for the macro to function properly. The rest are used to customize how the data will be displayed.

The information that must be accurately entered for the Populate macro to run properly is as follows:

- The filename of the Outlook Tool;
- The path to the folder containing the ForGE+ results that are to be imported (ending with “\”);
- The Scenario that is being analyzed; and
- The number of FEs that are considered.

Note that the ForGE+ results are organized by Scenario, with Scenario 0 representing the aggregate demands of all Scenarios.

The options that can be specified by the user include:

- Whether to display what percentage of each Capability is satisfied by each FE instead of the P and S indicators from the template;
- At what percentage is the satisfaction considered to be Strong instead of Partial. While the accepted number varied, in the end a value of 70% was used for the SCR;
- Should the P and S cells be colour-coded using the same format as the Capability aggregates; and
- At what percentages should the stoplight chart be red, yellow, or green. This section also allows for intermediate colours of orange and yellow-green to be specified. Table 1 shows two possible colour schemes, the default one using only red, yellow, and green, and an alternate version using the intermediate colours. Note that the conditions specified are checked in the given order until one of them is satisfied. So for the values given in the default scenario in Table 1, this means that a value of 80% or less will satisfy the condition for red and so red will be the chosen colour; a value greater than 80% but less than 100% will fail the conditions for red and orange, but satisfy yellow; and a value of 100% will fail the first four conditions and so the chosen colour will be green. In the alternate scenario, red will only be chosen if the satisfaction is 0%, orange will be chosen for any other value less than 50%, and so on. Note that in this scenario, anything from 90% satisfaction and up will be coloured green.

Table 1: Default Colour-Coding

Colour	Condition on Percent Contribution	
	Default	Alternate
Red	≤ 80	≤ 0
Orange	< 80	< 50
Yellow	< 100	< 70
Yellow-Green	< 100	< 90
Green	Anything Else	Anything Else

2.2 Data Rows

Figure 3 shows the results of a test run using notional data. For comparison purposes, the same Capabilities are expanded as in Figure 1. The interpretation of the data displayed here is also the same as the template in Figure 1. Note that in contrast to the original version, the new Outlook identifies non-contributing FEs with an N instead of a blank cell.

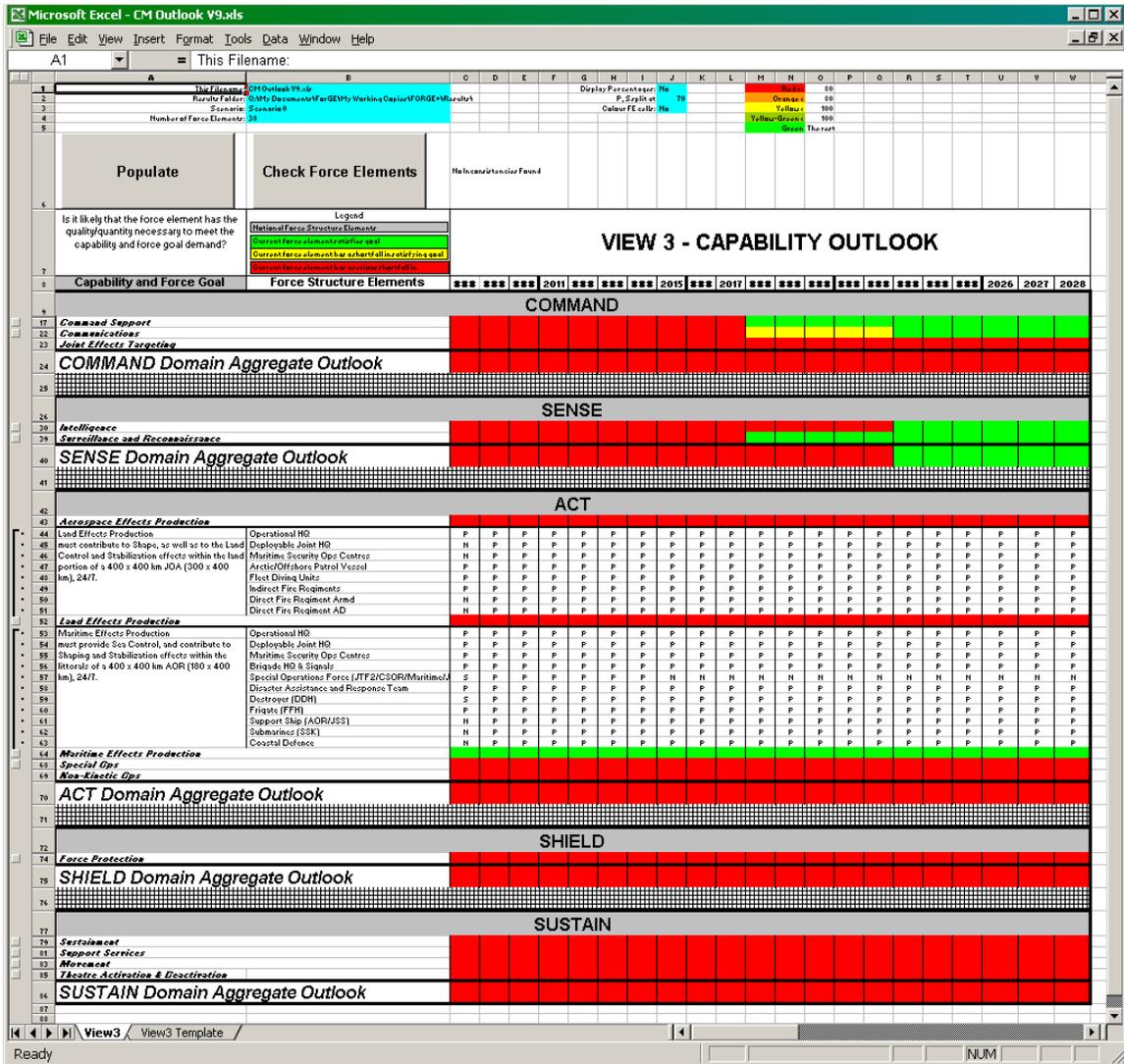


Figure 3: Outlook with Notional Results

2.3 Running the Scripts

The spreadsheet is intended to be very simple to use. If the user is confident that the FEs are consistent throughout the input files, then it is simply a case of filling out the header information as described in Section 2.1 and clicking the Populate button. If the FEs do need to be checked for consistency, the Check Force Elements button will create a list of all data files, identified by year, that are not consistent with the base file (the file for the year 2008). The Check Force Elements button will also automatically update the Header entry for the number of FEs. The scripts that are executed when the Check Force Elements and Populate buttons are clicked are included as Annex A and Annex B, respectively. This section is intended to summarize what those scripts do.

2.3.1 Force Elements Consistency

When the user clicks the Check Force Elements button, the macro executes the following steps:

1. It reads cells B1, B2, and B3 in the spreadsheet, containing the filename identifying the Outlook Tool, the folder where the ForGE+ results are saved, and the Scenario to look up in those results. These values are stored for reference later. Note that Scenario 0 was the name given to the amalgamation of all the scenarios that were analyzed in the SCR and so it was the scenario used for the final version of the Outlook.
2. It deletes the contents of cell C6, which should contain the results of the previous time this macro was run.
3. It sets the current year to 2008. If the same version of the Outlook Tool is to be used in the future, this should be the only part of the Force Elements Consistency macro that needs to be updated.
4. It opens the workbook containing the results for the current year and selects the tab containing the results for the scenario identified above.
5. It reads and counts the FEs listed in the selected tab and saves the list, in order, to memory.
6. It returns to the Outlook Tool and enters the number of FEs in cell B4.
7. It opens the results file for the next year (2009) and reads its list of FEs.
8. It compares the FE list for this year (2009) to the list read in step 5.
9. It repeats steps 7 and 8 for each subsequent year. Any year whose FE list is different from the list read in step 5 is identified in cell C6. If all results file have been read and no such inconsistencies are found, then that fact is identified in C6 instead.

While it would be possible to do all of this at the beginning of the Populate macro instead of as a separate script, there are two reasons why this has not been done. The first is that if there is an inconsistency with the FEs, then the macro would need to exit anyway to allow the user to correct any errors. Secondly, the slowest part of both macros is opening and reading from the data files. Since the FEs do not necessarily need to be checked every time the Populate button is clicked, it would be a waste of time to open and check the files more often than necessary. In particular, as the SCR progresses and the FE list becomes more and more standardized, the need to repeatedly check it for consistency diminishes.

2.3.2 Populating the Spreadsheet

When the user clicks the Populate button, the macro executes the following steps:

1. It resets the spreadsheet to its blank version (Figure 2).
2. Below each capability, a row is added for each FE, the number of which is read from cell B4.

3. It imports the results for each year of the Scenario identified in cell B5 and stores the contribution of each Force Element.
4. It determines the completeness of each Capability by amalgamating the contributions of each FE to that Capability.
5. It determines the colour-coding of the Capability boxes based on their completeness.
6. It determines the minimum completeness value of any Capability within a Domain and sets that as Domain completeness. Note that consideration was also given to using the average instead of the minimum. That choice can easily be changed in the macro code.
7. It determines the colour-coding of the Domain boxes based on their completeness.
8. It removes any blank FE rows (FEs that contribute nothing to a given Capability in any year).
9. It converts the remaining FE contributions to percentages.
10. As an option, Force Element contribution cells can be coloured following the same pattern as the Domains. By default, this option is off.
11. Also as an option set by the user, percent contributions in remaining rows can be converted to N (non-contributor), P (partial), S (Strong), or F (Full Contributor). By default, this option is on.
12. If space allows, the Capability name is repeated at the beginning of its contributing Force Elements (it is always displayed at the end, next to its stoplight chart) and below this its description, in terms of the associated FGs, is added.

2.4 Navigating the Spreadsheet

Once the spreadsheet has been populated, most users will simply want to review the stoplight diagram to see which Capabilities and Domains are satisfied and which ones have a shortfall or serious shortfall. These are indicated by the green, yellow, and red colour coding as indicated in Section 1.2.

Optionally, users can display the hidden FE rows by clicking on the grouping buttons at the left of the Outlook window. This will show how much each FE contributes to each Capability, either as a P or S for partial and strong contributors respectively, or the actual percent contribution, as specified in cell J1 before the spreadsheet was populated.

More specific detail can also be gleaned from the stoplight charts as the colour coded cells are not empty: they contain the values that were used to determine the colour of the cell, although the text is not visible because the macro sets it to the same colour as the background. To see the percent satisfaction of the Capabilities and Domains, one can simply set the text colour back to the default black.

3 Discussion

The original Capability Outlook was filled out based on best military judgement and gut feeling with a very high level of abstraction. The new SCR process attempts to take a closer look at what capability is actually provided by CF resources. This results in a significant amount of data generated by the ForGE+ tool, in a format that is not easily interpreted. The current Outlook Tool provides the best of both: it maintains the ease of understanding of the original Outlook, while being backed by the rigorous ForGE+ data.

While the Outlook has been used mainly as a briefing tool, providing a succinct and understandable view of what the CF can expect to achieve in the next 20 years, it is still traceable back to the original data that it was based on. The values used to fill out the spreadsheet are calculated directly from the results files; they are simply presented in a far more condensed format.

3.1 Future Work

If the Outlook Tool continues to be used in future iterations of the SCR, the only thing that would need to be modified is that the current version sets the starting year to 2008. This could be updated simply by going into the code and changing the number to correspond to the current year. A slightly more complicated but more permanent solution would be to add an entry in the header data that would be read by the code. It would also be possible to read the year from the computer clock, but this would limit the flexibility of the spreadsheet in the sense that a user could not set a past or future date as the baseline.

3.2 Recommendations

The Outlook Tool has been used with great success in the recent iteration of the SCR. It translated all of the data provided by ForGE+ into exactly the format that was requested. It is therefore reasonable that it should continue to be used in future SCRs. However, the SCR concept is still new and it is likely that the whole SCR process will continue to evolve through future iterations. Therefore, while the current Outlook Tool is ideal for the current SCR process, the two must continue to evolve together, rather than allowing the Outlook to be seen as a constraint on the SCR.

References

- [1] Fong, V., The ForGE+ Tool - A Tool from the Strategic Capability Roadmap version 1.0 Tool-suite, DRDC CORA Technical Note TN 2009-xxx, Draft
- [2] Zorz, Cdr J., G.L. Christopher, R. Petryk, V. Fong, M.G. Ball et al, Capability and Risk Outlook, (47 slides) to: Capability Development Board, Jan 2008; VCDS and most L1s (individual briefings), Feb 2008; Joint Capability Review Board, Mar 2008.
- [3] Christopher, G., Blakeney, D., Petryk, R., Taylor, B., Kerzner, L., Fong, V., Ball, M., Beard, A., Strategic Capability Roadmap Version 1.0 Analytic Framework, DRDC CORA Technical Report TR 2009-xxx, Draft.

Annex A “Check Force Elements” Macro

A.1 Summary

The code presented in this annex is executed when the “Check Force Elements” button on the Outlook Tool is clicked. This performs a consistency check for the number of force elements that need to be referenced by the Populate macro. It is not necessary to run this macro each time the spreadsheet is used, but it can be used as a quick troubleshooter.

A plain language summary of what this code does is provided in Section 2.3.1 of this report.

A.2 Code

```
Sub ForceElementConsistency()
```

```
' ForceElementConsistency Macro
```

```
' Macro recorded 11-01-2007 by Mark Ball
```

```
'Set Results folder, Outlook sheet name, Scenario for Results
```

```
Range("B1").Select
```

```
OutlookWorksheet = Selection.Value 'Should be the sheet that this script is run from
```

```
Range("B2").Select
```

```
ResultsFolder = Selection.Value
```

```
Range("B3").Select
```

```
ScenarioTab = Selection.Value
```

```
'Remove results from previous run
```

```
Range("C6").Select
```

```
Selection.ClearContents
```

```
'Get 2008 as the baseline
```

```
OutlookYear = 2008
```

```
'Open the file that contains Results for current year and select sheet for Scenario 0
```

```
Workbooks.Open Filename:=ResultsFolder & OutlookYear & "-CM_Opt_Results.xls"
```

```
Sheets(ScenarioTab).Select
```

```
RowNum = 8
```

```
ForceElements = ""
```

```
Do
```

```
    Range("B" & RowNum).Select
```

```
    ForceElements = ForceElements & Selection.Value
```

```
    RowNum = RowNum + 1
```

```
Loop While Selection.Value <> ""
```

```
ActiveWindow.Close
```

'Return to Outlook Sheet and edit Number of Force Elements in B4

Windows(OutlookWorksheet).Activate

Range("B4").Select

Selection.Value = RowNum - 9

For i = 1 To 20

 OutlookYear = i + 2008

 'Open the file that contains Results for current year and select sheet for Scenario 0

 Workbooks.Open Filename:=ResultsFolder & OutlookYear & "-CM_Opt_Results.xls"

 Sheets(ScenarioTab).Select

 RowNum = 8

 NewForceElements = ""

 Do

 Range("B" & RowNum).Select

 NewForceElements = NewForceElements & Selection.Value

 RowNum = RowNum + 1

 Loop While Selection.Value <> ""

 ActiveWindow.Close

 If NewForceElements <> ForceElements Then

 Windows(OutlookWorksheet).Activate

 Range("C6").Select

 If Selection.Value = "" Then

 Selection.Value = "Inconsistency found in " & OutlookYear

 Else

 Selection.Value = Selection.Value & ", " & OutlookYear

 End If

 End If

Next i

Windows(OutlookWorksheet).Activate

Range("C6").Select

If Selection.Value = "" Then Selection.Value = "No Inconsistencies Found"

End Sub

Annex B “Populate” Macro

B.1 Summary

The code presented in this annex is executed when the “Populate” button on the Outlook Tool is clicked. This fulfils the main purpose of the Outlook Tool, which is to collect, summarize, and visually represent the data in the results spreadsheets created by the ForGE+ tool.

A plain language summary of what this code does is provided in Section 2.3.2 of this report.

B.2 Code

Public OutlookYearColumns(20) **As String**

Public CapabilityDefinitions(14, 3)

Public DomainDefinitions(4, 2)

Sub PopulateOutlook()

'Populate Outlook macro 2007-11-06 by Mark Ball

'Resets Outlook template

'Adds rows for all Force Elements under each capability

' (assumption is that Force Elements in 2008 results sheet are the standard, can use "Check Force Elements" button to confirm)

'Imports results for each year

' NOTE: Capability completeness colour-coding is imported from Results sheets

'Calculates contribution of each Force Element

'Determines Min value of any Capability within a domain and sets that as Domain completeness

' (can also use average, formula for Average is commented out, can remove comment and instead comment out Min)

' NOTE: Domain completeness colour-coding is calculated here

'Once all data calculated, non-contributing Force Element rows are removed

'As an option, Force Element contribution cells can be coloured following the same pattern as the Domains

'Also as an option set by the user, percent contributions in remaining rows can be converted to N

' (non-contributor), P (partial), S (Strong), or F (Full Contributor)

'If space allows, Capability name is repeated at the beginning of its contributing Force Elements

' (it already exists at the end)

'If a second spare row is available, Capability description is also entered.

'Turn off Screen Updating

Application.ScreenUpdating = **False**

'Set Results folder, Outlook sheet name, Scenario for Results, Number of Force Elements

Range("B1").Select

OutlookWorksheet = Selection.Value 'Should be the sheet that this script is run from

Range("B2").Select

ResultsFolder = Selection.Value
Range("B3").Select
ScenarioTab = Selection.Value
Range("B4").Select
NumForceElements = Selection.Value

Range("J1").Select
DisplayPercentages = Selection.Value
Range("J2").Select
PSSplit = Selection.Value
Range("J3").Select
CoulourForceElements = Selection.Value

Range("O1").Select
RedRange = Selection.Value
Range("O2").Select
OrangeRange = Selection.Value
Range("O3").Select
YellowRange = Selection.Value
Range("O4").Select
GreenishRange = Selection.Value

'Set Columns in Outlook Tool that correspond to years

OutlookYearColumns(0) = "C"
OutlookYearColumns(1) = "D"
OutlookYearColumns(2) = "E"
OutlookYearColumns(3) = "F"
OutlookYearColumns(4) = "G"
OutlookYearColumns(5) = "H"
OutlookYearColumns(6) = "I"
OutlookYearColumns(7) = "J"
OutlookYearColumns(8) = "K"
OutlookYearColumns(9) = "L"
OutlookYearColumns(10) = "M"
OutlookYearColumns(11) = "N"
OutlookYearColumns(12) = "O"
OutlookYearColumns(13) = "P"
OutlookYearColumns(14) = "Q"
OutlookYearColumns(15) = "R"
OutlookYearColumns(16) = "S"
OutlookYearColumns(17) = "T"
OutlookYearColumns(18) = "U"
OutlookYearColumns(19) = "V"
OutlookYearColumns(20) = "W"

'Set Capability Names

CapabilityDefinitions(0, 0) = "Command Support"
CapabilityDefinitions(1, 0) = "Communications"

CapabilityDefinitions(2, 0) = "Joint Effects Targeting"
CapabilityDefinitions(3, 0) = "Intelligence"
CapabilityDefinitions(4, 0) = "Surveillance and Reconnaissance"
CapabilityDefinitions(5, 0) = "Aerospace Effects Production"
CapabilityDefinitions(6, 0) = "Land Effects Production"
CapabilityDefinitions(7, 0) = "Maritime Effects Production"
CapabilityDefinitions(8, 0) = "Special Ops"
CapabilityDefinitions(9, 0) = "Non-Kinetic Ops"
CapabilityDefinitions(10, 0) = "Force Protection"
CapabilityDefinitions(11, 0) = "Sustainment"
CapabilityDefinitions(12, 0) = "Support Services"
CapabilityDefinitions(13, 0) = "Movement"
CapabilityDefinitions(14, 0) = "Theatre Activation & Deactivation"

'Set Capability Row in Outlook

CapabilityDefinitions(0, 1) = 10
CapabilityDefinitions(1, 1) = 11
CapabilityDefinitions(2, 1) = 12
CapabilityDefinitions(3, 1) = 16
CapabilityDefinitions(4, 1) = 17
CapabilityDefinitions(5, 1) = 21
CapabilityDefinitions(6, 1) = 22
CapabilityDefinitions(7, 1) = 23
CapabilityDefinitions(8, 1) = 24
CapabilityDefinitions(9, 1) = 25
CapabilityDefinitions(10, 1) = 29
CapabilityDefinitions(11, 1) = 33
CapabilityDefinitions(12, 1) = 34
CapabilityDefinitions(13, 1) = 35
CapabilityDefinitions(14, 1) = 36

'Set Capability Column in Results

CapabilityDefinitions(0, 2) = "D"
CapabilityDefinitions(1, 2) = "E"
CapabilityDefinitions(2, 2) = "H" ' Note this one out of order
CapabilityDefinitions(3, 2) = "F"
CapabilityDefinitions(4, 2) = "G"
CapabilityDefinitions(5, 2) = "I"
CapabilityDefinitions(6, 2) = "J"
CapabilityDefinitions(7, 2) = "K"
CapabilityDefinitions(8, 2) = "L"
CapabilityDefinitions(9, 2) = "M"
CapabilityDefinitions(10, 2) = "N"
CapabilityDefinitions(11, 2) = "O"
CapabilityDefinitions(12, 2) = "P"
CapabilityDefinitions(13, 2) = "Q"
CapabilityDefinitions(14, 2) = "R"

'Set Capability Description in Outlook

CapabilityDefinitions(0, 3) = "requires rapidly deployable, scalable command elements to support expeditionary operations or domestic contingencies."

CapabilityDefinitions(1, 3) = "must provide deployable, high capacity Comms suites to support domestic contingencies and expeditionary operations."

CapabilityDefinitions(2, 3) = "must be deployable to support operations, move on short notice, be sustainable for the mission duration, and be available 24/7 once operational."

CapabilityDefinitions(3, 3) = "must have sufficient capacity to concurrently support day-to-day domestic operations and contingencies, as well as expeditionary operations for their duration, and be available 24/7."

CapabilityDefinitions(4, 3) = "must have the capacity to support domestic, continental and required expeditionary operations continuously."

CapabilityDefinitions(5, 3) = "must provide Air Control, and contribute to Shape and Stabilize effects, within a 400 x 400 km AOR, day/night 24/7, through the use of joint forces."

CapabilityDefinitions(6, 3) = "must contribute to Shape, as well as to the Land Control and Stabilization effects within the land portion of a 400 x 400 km JOA (300 x 400 km), 24/7."

CapabilityDefinitions(7, 3) = "must provide Sea Control, and contribute to Shaping and Stabilization effects within the littorals of a 400 x 400 km AOR (180 x 400 km), 24/7."

CapabilityDefinitions(8, 3) = "must contribute to the achievement of the Shape, Control and Stabilize effects within a 400 x 400 km JOA, as required."

CapabilityDefinitions(9, 3) = "must contribute to the creation of the Shape, Control and Stabilize effects, within a 400 x 400 km JOA and within the surrounding region, 24/7."

CapabilityDefinitions(10, 3) = "must appropriately and continuously protect the force from relevant threats, whether involved in day to day domestic operations, responding to a contingency in the arctic, or while engaged in expeditionary operations."

CapabilityDefinitions(11, 3) = "must continuously support domestic operations at home and abroad, contingencies when they arise, and expeditionary operations, as well."

CapabilityDefinitions(12, 3) = "must continuously administer routine operations both domestically and abroad, contingencies when they occur, and support expeditionary operations, as well."

CapabilityDefinitions(13, 3) = "must be able to support day-to-day domestic and contingency operations and expeditionary operations, as well."

CapabilityDefinitions(14, 3) = "must have sufficient capacity to concurrently support domestic contingency operations and expeditionary operations, as well."

'Set Domain Names

DomainDefinitions(0, 0) = "COMMAND"

DomainDefinitions(1, 0) = "SENSE"

DomainDefinitions(2, 0) = "ACT"

DomainDefinitions(3, 0) = "SHIELD"

DomainDefinitions(4, 0) = "SUSTAIN"

'Set Domain Rows

DomainDefinitions(0, 1) = 13

DomainDefinitions(1, 1) = 18

DomainDefinitions(2, 1) = 26

DomainDefinitions(3, 1) = 30

DomainDefinitions(4, 1) = 37

'Set number of Capabilities for each Domain

```
DomainDefinitions(0, 2) = 3  
DomainDefinitions(1, 2) = 2  
DomainDefinitions(2, 2) = 5  
DomainDefinitions(3, 2) = 1  
DomainDefinitions(4, 2) = 4
```

'Reset template

```
MaxRows = NumForceElements * 15 + 29  
Rows("9:" & MaxRows + 9).Select  
Selection.delete Shift:=xlUp  
Range("A9").Select  
Sheets("View3 Template").Select  
Range("A1:T29").Select  
Selection.Copy  
Sheets("View3").Select  
ActiveSheet.Paste
```

```
Selection.NumberFormat = "@"
```

'Make room for all Force Elements

```
For Cap = 0 To 14
```

```
OldCapRow = CapabilityDefinitions(Cap, 1) 'Determine Original Capability Row  
NewCapRow = OldCapRow + Cap * NumForceElements 'Capability Row has been moved  
'by previous iterations of this loop  
Rows(NewCapRow & ":" & NewCapRow + NumForceElements - 1).Select 'Select enough  
'rows, including current, for all force elements  
Selection.Insert Shift:=xlDown 'Insert blank rows  
Selection.Rows.Group ' Group new rows  
CapabilityDefinitions(Cap, 1) = OldCapRow + (Cap + 1) * NumForceElements 'Record  
'new location of this capability row
```

'Format Force Element Rows to have thick box around outside, thin vertical lines inside

```
Range("A" & NewCapRow & ":" & "W" & NewCapRow + NumForceElements - 1).Select  
'Same rows where new lines were inserted  
Selection.Borders(xlInsideHorizontal).LineStyle = xlNone  
With Selection.Borders(xlInsideVertical)  
.LineStyle = xlContinuous  
.Weight = xlThin  
.ColorIndex = xlAutomatic  
End With  
With Selection.Borders(xlEdgeLeft)  
.LineStyle = xlContinuous  
.Weight = xlThick  
.ColorIndex = xlAutomatic  
End With
```

With Selection.Borders(xlEdgeTop)

.LineStyle = xlContinuous

.Weight = xlMedium

.ColorIndex = xlAutomatic

End With

With Selection.Borders(xlEdgeBottom)

.LineStyle = xlContinuous

.Weight = xlMedium

.ColorIndex = xlAutomatic

End With

With Selection.Borders(xlEdgeRight)

.LineStyle = xlContinuous

.Weight = xlThick

.ColorIndex = xlAutomatic

End With

'Force Element rows inherited font from capabilities, return to non-bold, non-italic

Selection.Font.Bold = False

Selection.Font.Italic = False

Next Cap

'For each domain, update row number and formatting (Row height, fill shading) of cells

'inserted right after

NewRowsInserted = 0 'Used inside loop

FirstGoodRow = CapabilityDefinitions(0, 1) + 1 ' Used inside loop

LastGoodRow = CapabilityDefinitions(1, 1) - 1 ' Used inside loop

For Dom = 0 To 4

'Update Row in Domain Definitions for insertion of Force Elements

NewRowsInserted = NewRowsInserted + DomainDefinitions(Dom, 2) 'the number of times
'extra rows were inserted

DomainDefinitions(Dom, 1) = DomainDefinitions(Dom, 1) + NewRowsInserted * _
NumForceElements

'Formatting is wrong for first capability of each domain

FirstBadRow = DomainDefinitions(Dom, 1) - DomainDefinitions(Dom, 2) * _
(NumForceElements + 1) ' +1 accounts for the capability row, (Dom,2) is number of
'capabilities

LastBadRow = FirstBadRow + NumForceElements - 1

Rows(FirstGoodRow & ":" & LastGoodRow).Select

Selection.Copy 'Copy good rows

Rows(FirstBadRow & ":" & LastBadRow).Select

Selection.PasteSpecial Paste:=xlFormats, Operation:=xlNone, SkipBlanks:= _
False, Transpose:=False 'Paste to bad rows

Next Dom

'Get Results for each year

For LookAheadYears = 0 To 20

```

OutlookYear = LookAheadYears + 2008
OutlookYearColumn = OutlookYearColumns(LookAheadYears)
If OutlookYear > 2008 Then PreviousOutlookYearColumn = _
    OutlookYearColumns(LookAheadYears - 1)

```

```

'Open the file that contains Results for current year and select sheet for Scenario 0
Workbooks.Open Filename:=ResultsFolder & OutlookYear & "-CM_Opt_Results.xls"
Sheets(ScenarioTab).Select

```

```

For Cap = 0 To 14

```

```

    'If this is the first file opened, copy list of Force Elements

```

```

    If OutlookYear = 2008 Then
        Range("B8:B" & NumForceElements + 7).Select 'List of Force Elements always starts
            'at B8
        Selection.Copy
        Windows(OutlookWorksheet).Activate ' Return to Outlook Window
        Range("B" & CapabilityDefinitions(Cap, 1) - NumForceElements).Select 'Select first
            'cell to contain Force Element list
        Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
            False, Transpose:=False
        Windows(OutlookYear & "-CM_Opt_Results.xls").Activate 'Return to Results window.
    End If

```

```

    'Keep running total of capability completeness
    CapabilityResults = ""

```

```

    'Determine contribution of each Force Element

```

```

    For ForElem = 1 To NumForceElements
        'Return to Results window
        Windows(OutlookYear & "-CM_Opt_Results.xls").Activate
        Range(CapabilityDefinitions(Cap, 2) & ForElem + 7).Select '(Cap,2) has column for
            'Capability, ForElem + 7 has row for Force Element
        ElementContribution = Selection.Text

```

```

        'Return to Outlook sheet
        Windows(OutlookWorksheet).Activate

```

```

        'if Element Contribution string was empty, overwrite values with carry-over from
            'previous year

```

```

        If Len(ElementContribution) = 0 And OutlookYear > 2008 Then
            Range(PreviousOutlookYearColumn & CapabilityDefinitions(Cap, 1) - _
                NumForceElements + ForElem - 1).Select
            ElementContribution = Selection.Text
        End If

```

```

        If Len(ElementContribution) > 0 Then ' Force Element is a contributor (may or may not

```

```

'have been updated by previous step

' if this is the first contributing Force Element, total capability result will be the same
If CapabilityResults = "" Then CapabilityResults = ElementContribution 'used
    'mainly to set the length, otherwise redundant with adding 1's in next step

For Digit = 1 To Len(ElementContribution)
    'if digit is a 1, running total needs a 1 as well
    If Mid(ElementContribution, Digit, 1) = "1" Then _
        Mid(CapabilityResults, Digit, 1) = "1"
    Next Digit
End If

Range(OutlookYearColumn & CapabilityDefinitions(Cap, 1) - NumForceElements + _
    ForElem - 1).Select
Selection.Value = ElementContribution
Next ForElem

'Calculate score for capability
CapScore = 0#
If Len(CapabilityResults) > 0 Then
    For Digit = 1 To Len(CapabilityResults)
        'if digit is a 1 then capability score goes up by 1
        If Mid(CapabilityResults, Digit, 1) = "1" Then CapScore = CapScore + 1
    Next Digit
    CapScore = Round(CapScore / Len(CapabilityResults) * 100)
End If

'Check value just calculated to determine cell colour
If CapScore < RedRange Then
    StopLightColour = RGB(220, 20, 60) ' red
ElseIf CapScore < OrangeRange Then
    StopLightColour = RGB(255, 140, 0) ' orangish
ElseIf CapScore < YellowRange Then
    StopLightColour = RGB(255, 255, 25) ' yellowish
ElseIf CapScore < GreenishRange Then
    StopLightColour = RGB(154, 205, 50) ' yellow-greenish
Else
    StopLightColour = RGB(20, 220, 0) ' green
End If

'Select cell for this year and capability and enter Colour and completeness
Range(OutlookYearColumn & CapabilityDefinitions(Cap, 1)).Select 'Cell columns
    'corresponds to year, row in (Cap,1)
Selection.Interior.Color = StopLightColour
Selection.NumberFormat = "0"
Selection.Value = CapScore
'Set font colour to same as fill so numbers aren't filling screen

```

```
Selection.Font.Color = StopLightColour
```

```
'Return to Results window.
```

```
'If more Capabilities remain, need to be there to select next results.
```

```
'If not, need to be there to close it (see after end of this loop)
```

```
Windows(OutlookYear & "-CM_Opt_Results.xls").Activate
```

```
Next Cap
```

```
'Close Results window
```

```
ActiveWindow.Close
```

```
'Return to Outlook Worksheet
```

```
Windows(OutlookWorksheet).Activate
```

```
'For each Domain, calculate it's completeness as Min (or Average) of its components
```

```
For Dom = 0 To 4
```

```
Range(OutlookYearColumns(LookAheadYears) & DomainDefinitions(Dom, 1)).Select
```

```
'Select cell for current Domain & Year
```

```
'Set cells to calculate Min or Average from
```

```
SelectionString = ""
```

```
For DomCap = 1 To DomainDefinitions(Dom, 2)
```

```
  If SelectionString = "" Then
```

```
    SelectionString = "R[-" & (DomCap - 1) * (NumForceElements + 1) + 1 & "]C"
```

```
  Else
```

```
    SelectionString = SelectionString & ",R[-" & (DomCap - 1) * (NumForceElements _  
      + 1) + 1 & "]C"
```

```
  End If
```

```
Next DomCap
```

```
Selection.NumberFormat = "0"
```

```
'ActiveCell.FormulaR1C1 = "=AVERAGE(" & SelectionString & ")"
```

```
ActiveCell.FormulaR1C1 = "=MIN(" & SelectionString & ")"
```

```
'Check value just calculated to determine cell colour
```

```
DomainCompleteness = Selection.Value
```

```
If DomainCompleteness < RedRange Then
```

```
  StopLightColour = RGB(220, 20, 60) ' red
```

```
Elseif DomainCompleteness < OrangeRange Then
```

```
  StopLightColour = RGB(255, 140, 0) ' orangish
```

```
Elseif DomainCompleteness < YellowRange Then
```

```
  StopLightColour = RGB(255, 255, 25) ' yellowish
```

```
Elseif DomainCompleteness < GreenishRange Then
```

```
  StopLightColour = RGB(154, 205, 50) ' yellow-greenish
```

```
Else
```

```
  StopLightColour = RGB(20, 220, 0) ' green
```

```
End If
```

```
Selection.Interior.Color = StopLightColour
```

```
'Set font colour to same as fill so numbers aren't filling screen
```

```
Selection.Font.Color = StopLightColour
```

```
Next Dom
```

```
Next LookAheadYears
```

```
'Remove all blank Force Element Rows
```

```
For RowNum = CapabilityDefinitions(14, 1) To 10 Step -1 ' go backwards so removing rows  
'doesn't mess up numbering (14,1) holds row after the last Force Element
```

```
Range("A" & RowNum).Select
```

```
CapabilityEntry = Selection.Text
```

```
Range("B" & RowNum).Select
```

```
ForceElemEntry = Selection.Text
```

```
If CapabilityEntry = "" And ForceElemEntry <> "" Then ' if the capability column is empty  
'and the force element is not, then this row represents a force element
```

```
TotalElemContribution = 0
```

```
For LookAheadYear = 0 To 20
```

```
Range(OutlookYearColumns(LookAheadYear) & RowNum).Select
```

```
'Convert from 1s and 0s to percentage
```

```
ElemScore = 0#
```

```
ElementContribution = Selection.Text
```

```
If Len(ElementContribution) > 0 Then 'Force Element is a contributor, otherwise only  
'contributes in later years
```

```
For Digit = 1 To Len(ElementContribution)
```

```
If Mid(ElementContribution, Digit, 1) = "1" Then ElemScore = ElemScore + 1
```

```
Next Digit
```

```
ElemScore = Round(ElemScore / Len(ElementContribution) * 100)
```

```
End If
```

```
Selection.Value = ElemScore
```

```
Selection.NumberFormat = "0"
```

```
TotalElemContribution = TotalElemContribution + Selection.Value
```

```
Next LookAheadYear
```

```
If TotalElemContribution = 0 Then ' this force element does not contribute to capability,  
'delete row
```

```
Rows(RowNum & ":" & RowNum).Select
```

```
Range("B" & RowNum).Activate
```

```
Selection.delete Shift:=xlUp
```

```
'Update Capability and Domain rows
```

```
For Cap = 0 To 14
```

```
CapRow = CapabilityDefinitions(Cap, 1)
```

```
If CapRow >= RowNum Then CapabilityDefinitions(Cap, 1) = CapRow - 1
```

```

        'Capability just got moved up 1 row
    Next Cap
    For Dom = 0 To 4
        DomRow = DomainDefinitions(Dom, 1)
        If DomRow >= RowNum Then DomainDefinitions(Dom, 1) = DomRow - 1 'Domain
            'just got moved up 1 row
        Next Dom
    Else
        'If row is not deleted, change entries to N,P,S,F as appropriate and colour

        'Change Colour
        If ColourForceElements = "yes" Or ColourForceElements = "Yes" Then
            For LookAheadYear = 0 To 20
                Range(OutlookYearColumns(LookAheadYear) & RowNum).Select
                If Selection.Value < RedRange Then
                    Selection.Interior.Color = RGB(220, 20, 60) ' red
                ElseIf Selection.Value < OrangeRange Then
                    Selection.Interior.Color = RGB(255, 140, 0) ' orangish
                ElseIf Selection.Value < YellowRange Then
                    Selection.Interior.Color = RGB(255, 255, 25) ' yellowish
                ElseIf Selection.Value < GreenishRange Then
                    Selection.Interior.Color = RGB(154, 205, 50) ' yellow-greenish
                Else
                    Selection.Interior.Color = RGB(20, 220, 0) ' green
                End If
            Next LookAheadYear
        End If

        'Convert from percentage to level indicator
        If DisplayPercentages = "no" Or DisplayPercentages = "No" Then
            For LookAheadYear = 0 To 20
                Range(OutlookYearColumns(LookAheadYear) & RowNum).Select
                If Selection.Value = 0 Then
                    Selection.Value = "N" ' Non-Contributor
                ElseIf Selection.Value < PSSplit Then
                    Selection.Value = "P" ' Partial Contributor
                ElseIf Selection.Value < 100 Then
                    Selection.Value = "S" ' Strong Contributor
                Else ' Contribution must be 100 %
                    'Selection.Value = "F" ' Full Contributor
                    Selection.Value = "S" ' Removed distinction between Strong and Full
                End If
                Selection.HorizontalAlignment = xlCenter
            Next LookAheadYear
        End If
    End If
End If
Next RowNum

```

```

'For every capability, if there are at least two spaces available above Capability Name,
' re-enter capability name in first and description in second
' If there are still empty cells below description, merge them with description.
For Cap = 0 To 14
    CapRow = CapabilityDefinitions(Cap, 1)
    EmptyCells = 0
    RowCheck = CapRow - 1
    Do
        Range("A" & RowCheck).Select
        If Selection.Text = "" Then
            EmptyCells = EmptyCells + 1
            RowCheck = RowCheck - 1
        End If
    Loop While Selection.Text = ""
    If EmptyCells > 0 Then
        Range("A" & CapRow - EmptyCells).Select
        Selection.Value = CapabilityDefinitions(Cap, 0)
        If EmptyCells > 1 Then
            Range("A" & CapRow - EmptyCells + 1).Select
            Selection.Value = CapabilityDefinitions(Cap, 3) 'Enter Capability description
            If EmptyCells > 2 Then
                'Merge Cells that will contain Capability description
                Range("A" & CapRow - EmptyCells + 1 & ":A" & CapRow - 1).Select ' From row
                'where description was entered to last row before Capability
                With Selection
                    .VerticalAlignment = xlTop
                    .WrapText = True
                    .MergeCells = True
                End With
            End If
        End If
    End If
Next Cap

'Close all Groups of Force Elements
ActiveSheet.Outline.ShowLevels RowLevels:=1
End Sub

```

List of acronyms

CF	Canadian Forces
CFD	Chief of Force Development
FE	Force Element
FG	Force Goal
ForGE	Force Generation Evaluation
OR	Operational Research
SCR	Strategic Capability Roadmap

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3. TITLE (The complete document title as indicated on the title page. Its classification should be indicated by the appropriate abbreviation (S, C or U) in parentheses after the title.) The Outlook Tool: A Tool from the Strategic Capability Roadmap version 1.0 Tool-suite			
4. AUTHORS (last name, followed by initials – ranks, titles, etc. not to be used) Ball, M.G.			
5. DATE OF PUBLICATION (Month and year of publication of document.) June 2009	6a. NO. OF PAGES (Total containing information, including Annexes, Appendices, etc.) 41	6b. NO. OF REFS (Total cited in document.) 1	
7. DESCRIPTIVE NOTES (The category of the document, e.g. technical report, technical note or memorandum. If appropriate, enter the type of report, e.g. interim, progress, summary, annual or final. Give the inclusive dates when a specific reporting period is covered.) Technical Note			
8. SPONSORING ACTIVITY (The name of the department project office or laboratory sponsoring the research and development – include address.) Defence R&D Canada 305 Rideau Street Ottawa, Ontario K1A 0K2			
9a. PROJECT OR GRANT NO. (If appropriate, the applicable research and development project or grant number under which the document was written. Please specify whether project or grant.)		9b. CONTRACT NO. (If appropriate, the applicable number under which the document was written.)	
10a. ORIGINATOR'S DOCUMENT NUMBER (The official document number by which the document is identified by the originating activity. This number must be unique to this document.) DRDC CORA TN 2009-028		10b. OTHER DOCUMENT NO(s). (Any other numbers which may be assigned this document either by the originator or by the sponsor.)	
11. DOCUMENT AVAILABILITY (Any limitations on further dissemination of the document, other than those imposed by security classification.) Unlimited			
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From Fall 2007 to Spring 2008, the Strategic Planning Operational Research (OR) Team, Joint Staff OR Team and Central OR Team provided support to the Chief of Force Development during development of the first version of the Strategic Capability Roadmap (SCR). The SCR is a capability plan that ultimately prioritizes and schedules the programs necessary to meet the demands of the future security environment over the next 20 years.

As part of their contribution, JSORT developed the Outlook Tool which is used to compress a large amount of data, based on Subject Matter Expert capability assessments, into a prescribed format that was comprehensive, understandable, traceable, and presentable.

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Strategic Capability Roadmap; Capabilty Outlook; Capability Based Planning



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